

**DEFENSE CONTRACT MANAGEMENT
COMMAND**



Software CAS Overview & Initiatives

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DCMDE Commander's Conference
August 1999
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Software Complexity Concerns*

A Growing Concern

- In 1995 85% of Software Projects Finished Over Time or Budget
- 1/2 of Projects Double Cost Estimates
- Projects Slip an Average of 36 Months
- 1/3 of Projects Cancelled

Source: AIA, "A Growing Software Engineering Practice, Patricia Sanders, Jan 1999

*Chart presented by Dr Etter, DUSD(S&T) to DoD Software Collaboration Workshop - 30 J



DCMC Can Make a Difference

Software CAS Mission

- Evaluate for adequacy and perform surveillance of contractor software development processes [FAR* 42.302(a)(41), DoD 5000.2R** (3.3.5.5, 3.3.5.6)]
- Perform surveillance to assess compliance with schedule, cost, and technical performance [FAR 42.302(a)(15, 31, 40)]
- On Site Government Assistance [DoD 5000.2R (3.3.5.5, 3.3.5.6), (3.3.6.6), FAR 42.302(a) (32,43-47,67)]

*Federal Acquisition Regulation

**Department of Defense Regulation 5000.2R, Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs

Interrelated Functions



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Software CAS Integrated Plan

Goal 1: Enhance Program Office visibility

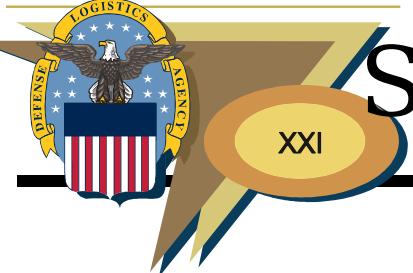
- 1.1: Provide insight concerning contractor processes
- 1.2: Provide insight concerning contractor performance
- 1.3: Maintain cognizance of, and assist as requested in, source selection process evaluations

Goal 2: Continuous Software CAS process improvement

- 2.1: Establish a consistent and repeatable CAS approach
- 2.2: Determine necessary skills and develop training
- 2.3: Develop and refine tools and resources

Additional Information:

April 99 DCMC Special Management Review



Software CAS Integrated Plan

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Goal 2: C

- 1:
- 2:
- 2.3:

Initiative

**Capability Maturity Model
(CMM) Based Insight**

Information Memo 99-255

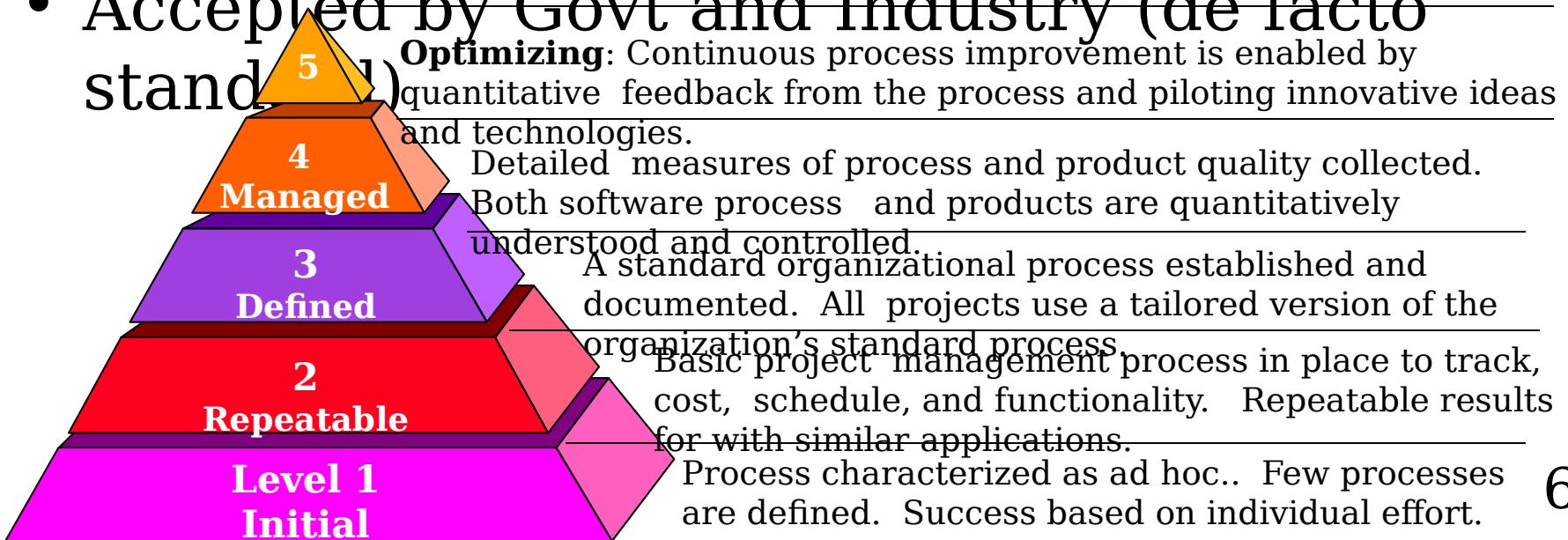
(9 Aug 99)

valuations



[Software] CMM - Background

- Determines maturity of contractors software development **processes**
- Developed by the Software Engineering Institute (SEI) at Carnegie Mellon University
- Accepted by Govt and Industry (**de facto** standard)





Software Processes - Importance

- Today's major problems with military software development are not technical problems, but management problems
Software Engineering Institute*
- By reaching CMM level III, Lockheed Martin Tactical Aircraft Systems [over 5 year period];
 - Cut software defects 90%
 - Reduced software development costs 50%Aviation Week & Space Technology**

*The Capability Maturity Model, Guidelines for Improving the Software Process, Carnegie Mellon University, Addison-Wesley Publishing, 1997, pg 4

** Lockheed Martin Restructures TAS Unit as 'Fighter Enterprise', July 28 1997, page 64



Software Processes - Importance Process linked to Performance

As maturity increases*, cost and schedule performance indices approach 100% --

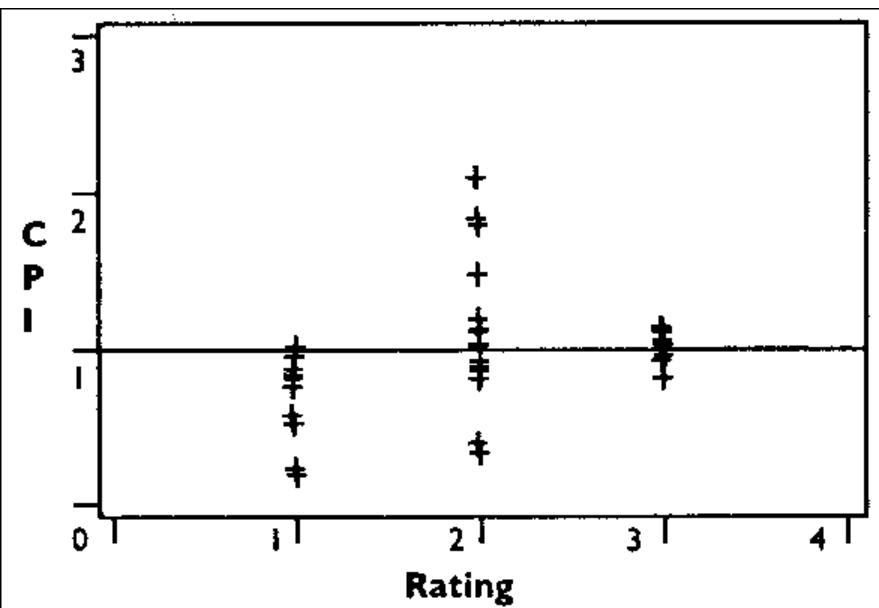


FIGURE 3: SCATTER PLOT OF CPI VS. RATING FOR HIGH AND VERY HIGH RATING RELEVANCE.

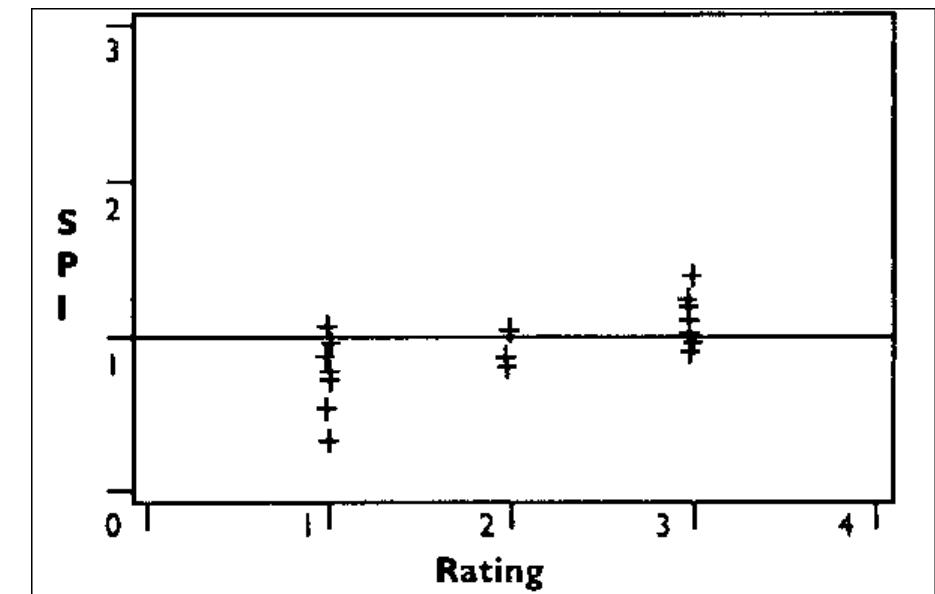


FIGURE 4: SCATTER PLOT OF SPI VS. RATING FOR LESS THAN 80 PERCENT COMPLETE.

Data from Air Force Institute of Technology Thesis, "A Correlation Study of the CMM and Software Development Performance"

(www.stsc.hill.af.mil/Crosstalk/1995/sep)

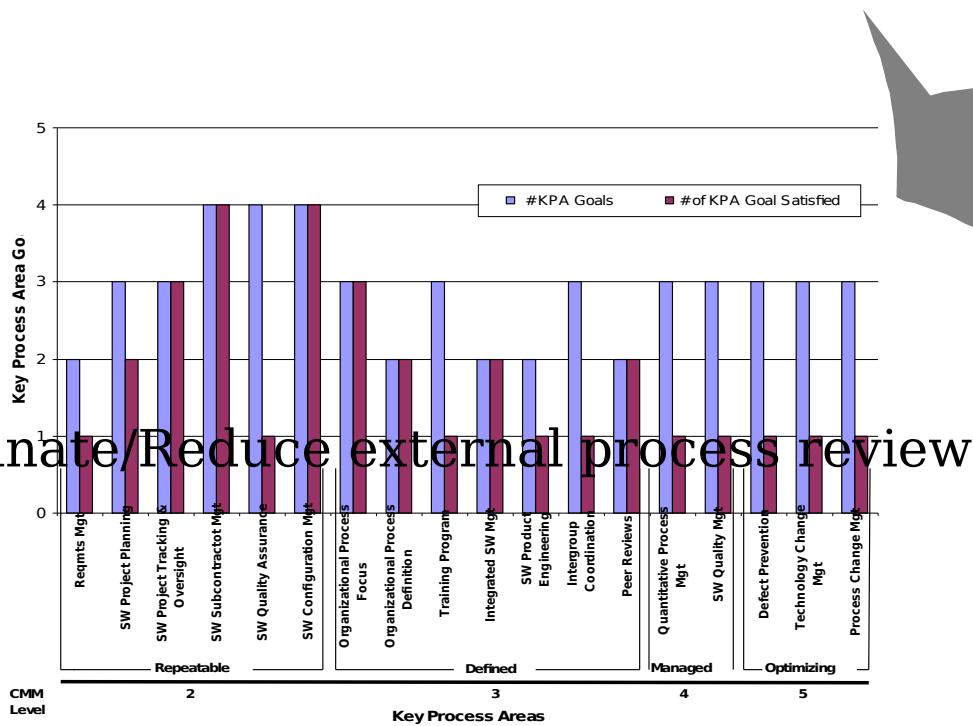
* Per Software Engineering Institute's (SEI) Software Capability



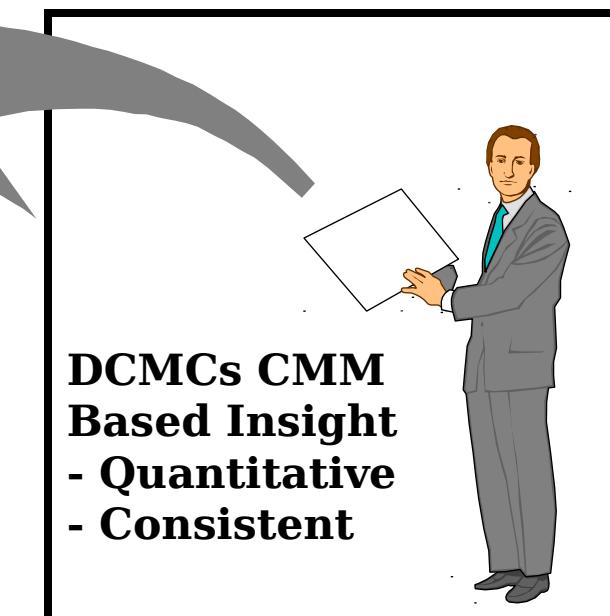
DCMC Initiative: CMM Based Insight

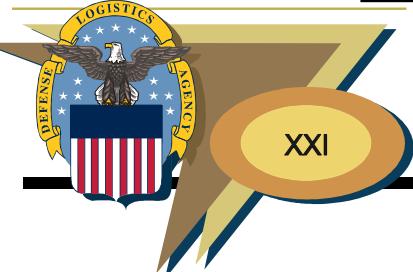
Aligns SW Process evaluations to the CMM

- Puts data in most useful format (Common language)
 - Basis of Capability Evaluations (Program Offices)
 - Basis of internal process reviews (Industry)
- Consistent application across DCMC



- Eliminate/Reduce external process reviews





Example: Common Language for ~~Risk Reduction~~ DCMC Location X

- Army AMCOM concerned with poor quality software at contractor's facility - Told contractor to improve process (CMM Level III) or risk future business
- Contractor hired outside consultant to verify operations (**Believed they were CMM Level III**)
 - Consultant provided early feedback to AMCOM - Contractor appeared to be level III
 - AMCOM challenged based on observations and DCMC process data
- Evaluation results: **Contractor assessed as level I.**
- Contractor on ambitious schedule to reach level III
- DCMC monitoring progress - advising AMCOM of status

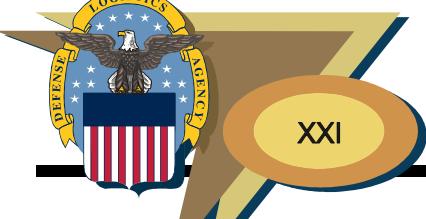


Example.

Eliminate/Reduce Process Reviews

DCMC Location X

- SW CMM based surveillance in place
- Customer (Army ACAT I Program) concerned with process maturity - planned multi service software process review
- DCMC provided company and program level strengths and weaknesses
- Result:
 - DCMC data satisfied customer concerns
 - Customer did not perform the software process review
 - Savings of 6 man-days on site plus travel time/costs



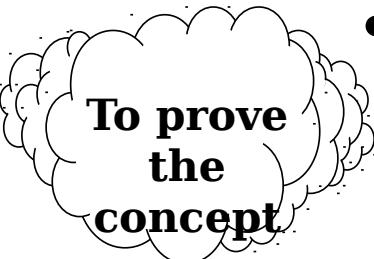
Implementation

- Approach in development (Apr - Aug 99)
 - Development Team:

| <u>Qualification</u> | <u>Location</u> |
|----------------------|----------------------------------|
| • David Zentner | SEI Affiliate Software Center |
| • Gary Sigmund | SEI Affiliate LM Delaware Valley |
| • Joe Giannuzzi | SEI Affiliate Syracuse |
| • Richard Sierzant | SEI Affiliate Denver |
| • Wayne Wall | Process in Use Syracuse |
| • Lisa Ming | Process in Use Boston |
| • Jamileh Soudah | Measurement/Tool Software Center |
 - Briefing Industry Corporate Councils - initial response favorable



Implementation



- Validation Testing: Sep-Dec 1999
 - DCMC Syracuse
 - DCMC Boston (Nashua)
 - DCMC Denver
 - DCMC LM Delaware Valley
- Verification Testing: Mar-Jun 2000
 - Five TBD Locations; Volunteers solicited
- Training (June/July 2000)
- Command Wide (July 2000 Target)

Information Memo 99-255 (9 Aug 99)



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Software CAS Integrated Plan

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process evaluations

Goal 2: Continuous Software CAS process improvement

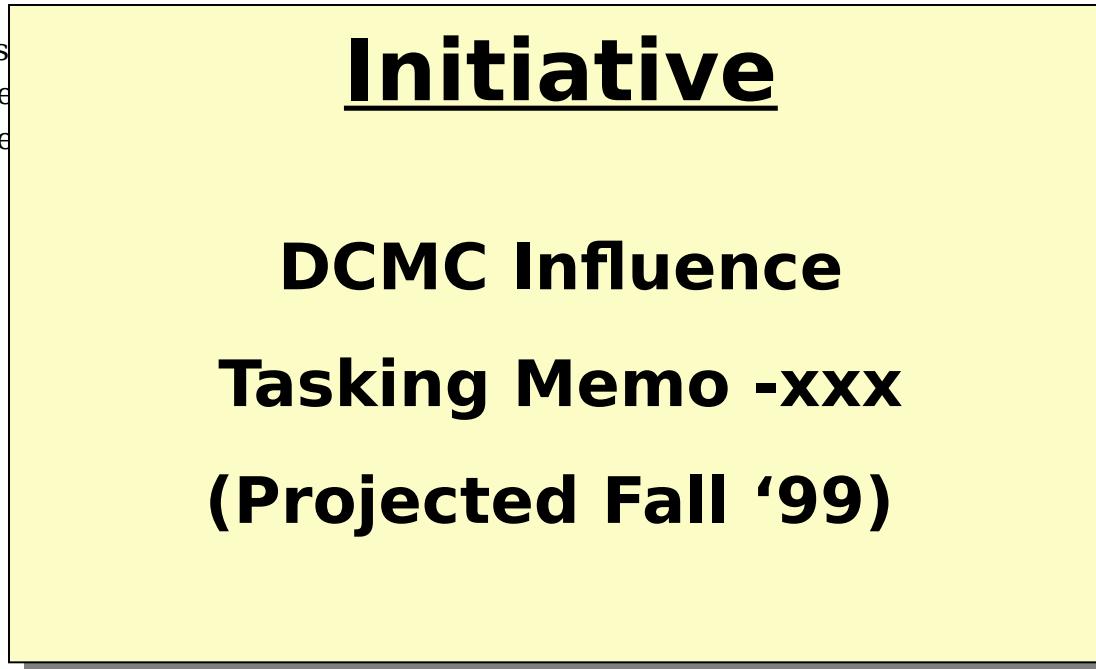
- 2.1: Es
- 2.2: De
- 2.3: De

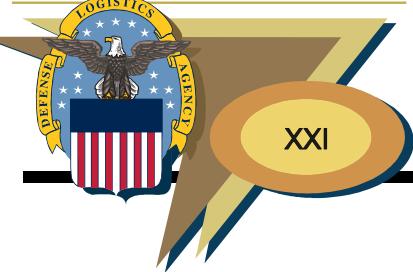
Initiative

DCMC Influence

Tasking Memo -xxx

(Projected Fall '99)





DCMC Influence

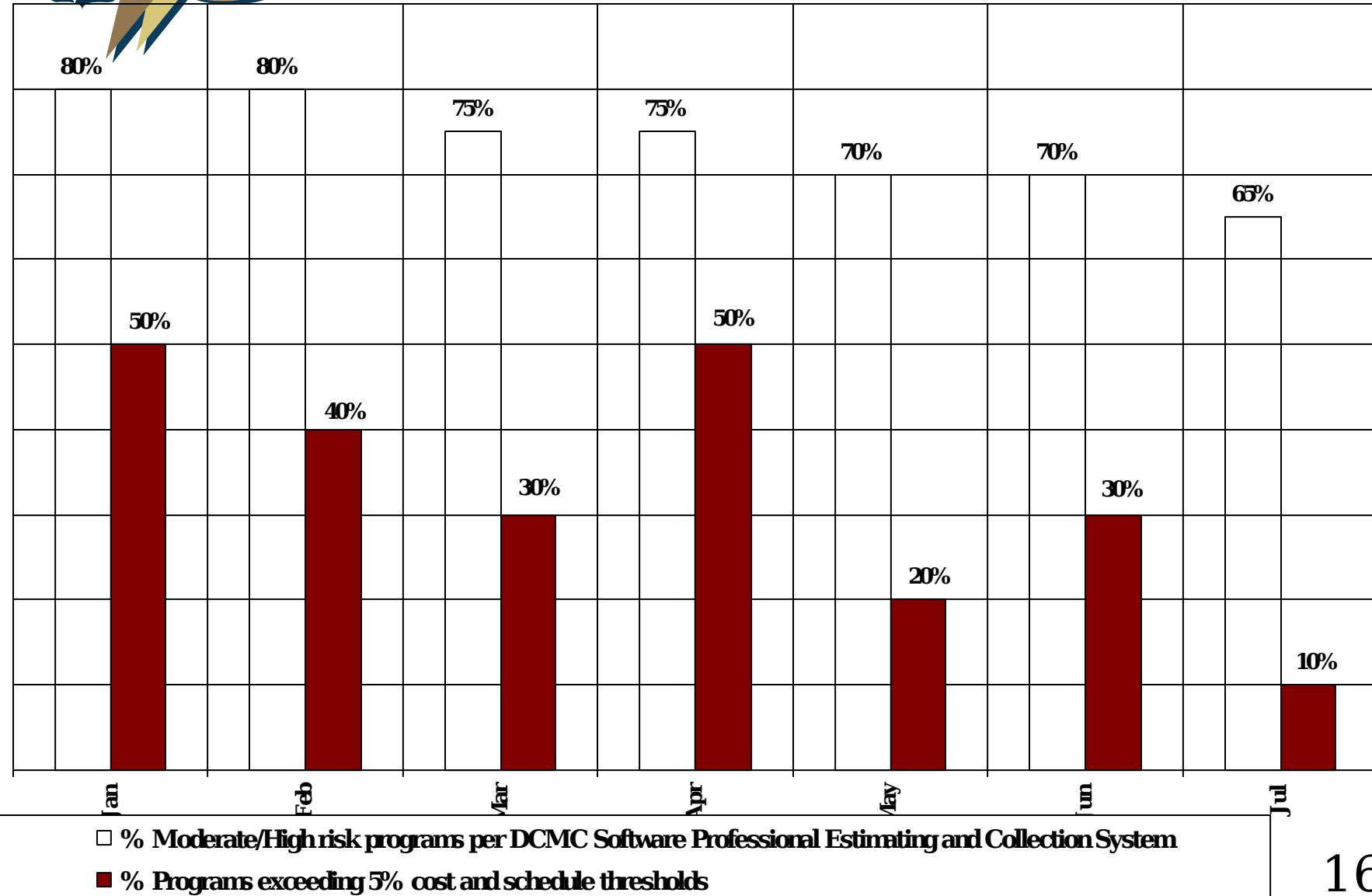
- DCMC influences software development process - How to best measure our impact?
 - Past system: Comments accepted vs comments generated
 - Problem: What does it tell you?
 - ***Proposed*** System:
 - Monitor status of high risk programs exceeding performance thresholds
 - Correlate alignment of DCMC resources and comments to determine result of our influence



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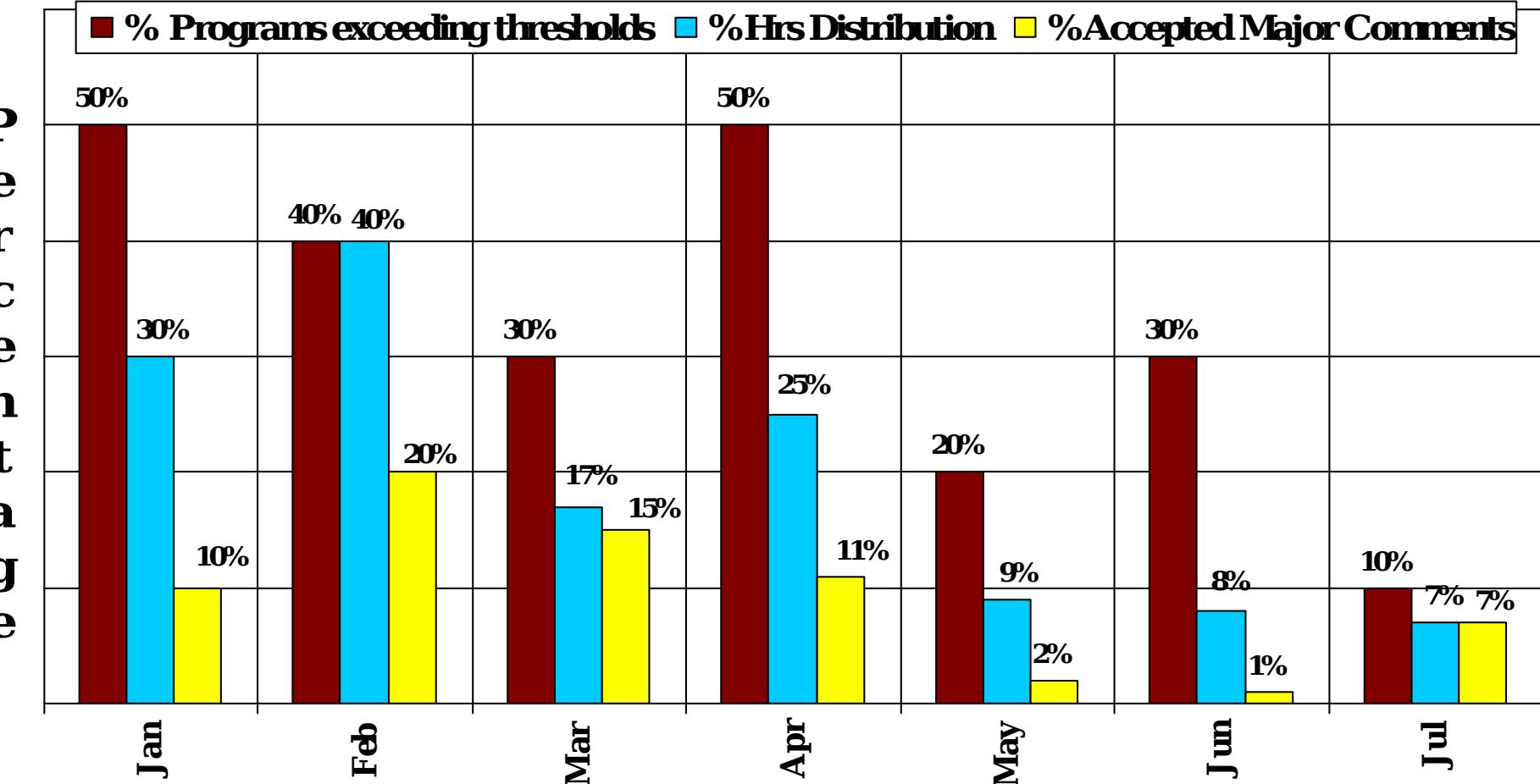
Proposed Metric

Software Program Status





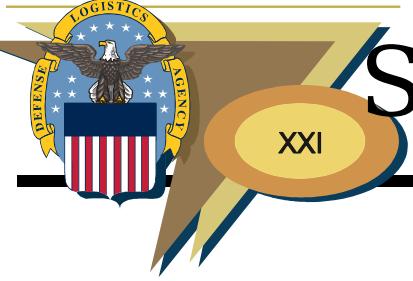
Peel back: DCMC Activity on programs exceeding 5% performance thresholds





DCMC Influence

- Metric concept in draft - Developed with field support
- Soliciting feedback from:
 - Software Program Manager's Network - 12 Aug 99
 - DCMC CAOs: 31 Aug - 2 Sep Software Symposium
- Tasking Memo: Projected Fall 99
 - Baseline data & Validation: Oct 99 - Mar 00
 - Implementation phase: Apr 00



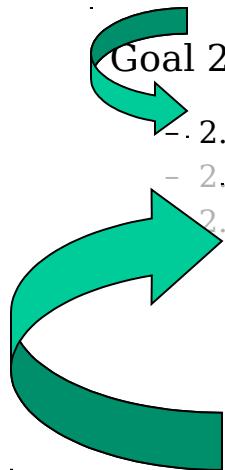
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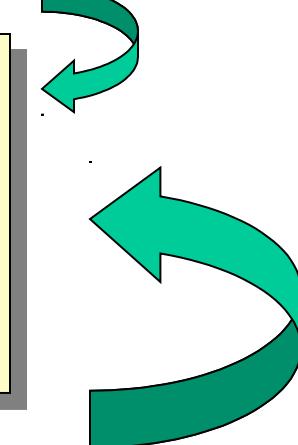
Goal 2: Continuous Software CAS process improvement

- 2.1: Est
- 2.2: Det
- 2.3: Dev

Initiative

Software Performance Maturity Model

Tasking Memo 99-255 (9 Aug 99)

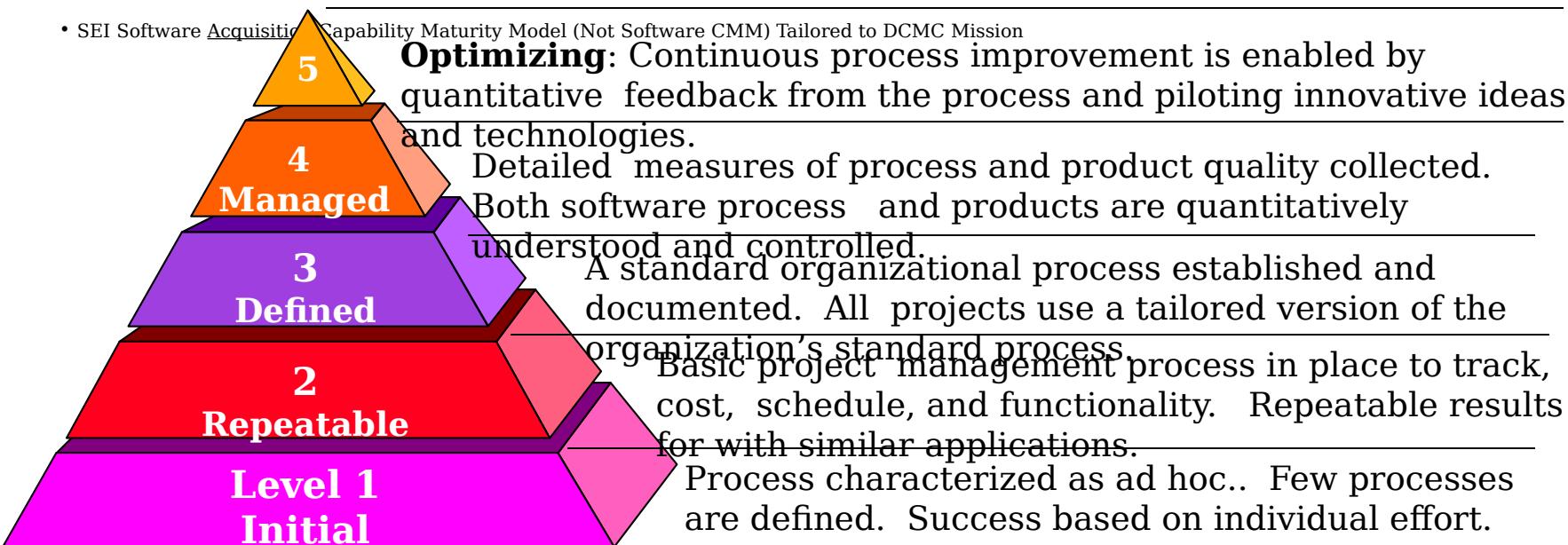




Software Performance Maturity Model

- Apply same philosophy (Process) on DCMC as used in Industry

- SEI Software Acquisition Capability Maturity Model (Not Software CMM) Tailored to DCMC Mission

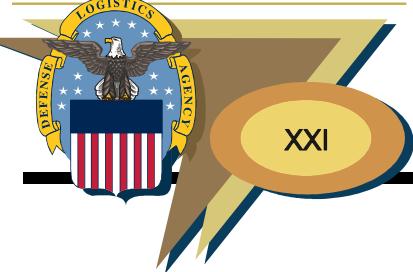




Software Performance Maturity Model

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- ✓ Developed Model with field team: Jan-Mar 99
- ✓ Pilot tested at DCMC CAOs: Mar - May 99
 - Sikorsky
 - LM Federal Systems (Owego)
 - Boeing, Seattle
 - Baltimore
 - LM Missiles & Space-Sunnyvale
 - Boeing, Phil
- ✓ Model updated: Jul 99
- CAO Training:
 - Software Symposium (31 Aug-2 Sep) - Concept and plan
 - Detailed CAO training (14-16 Sep, 28-30 Sep)
- CAO site visits (Oct -Mar) Feedback: Immediate
- DCMC Corporate Roadmap for improvement: Apr 99



Software Performance Maturity Model

Corporate Road Map for Improvement

- First Application of Software Acquisition CMM within DoD
- Analyze current command status
 - Level I to Level II averages 27 months
 - Level II to Level III averages 24 months
- Probably result in changes to policy, training, guidance, and the model

SEI historical data for SW CMM

Blazing new ground but on the right path

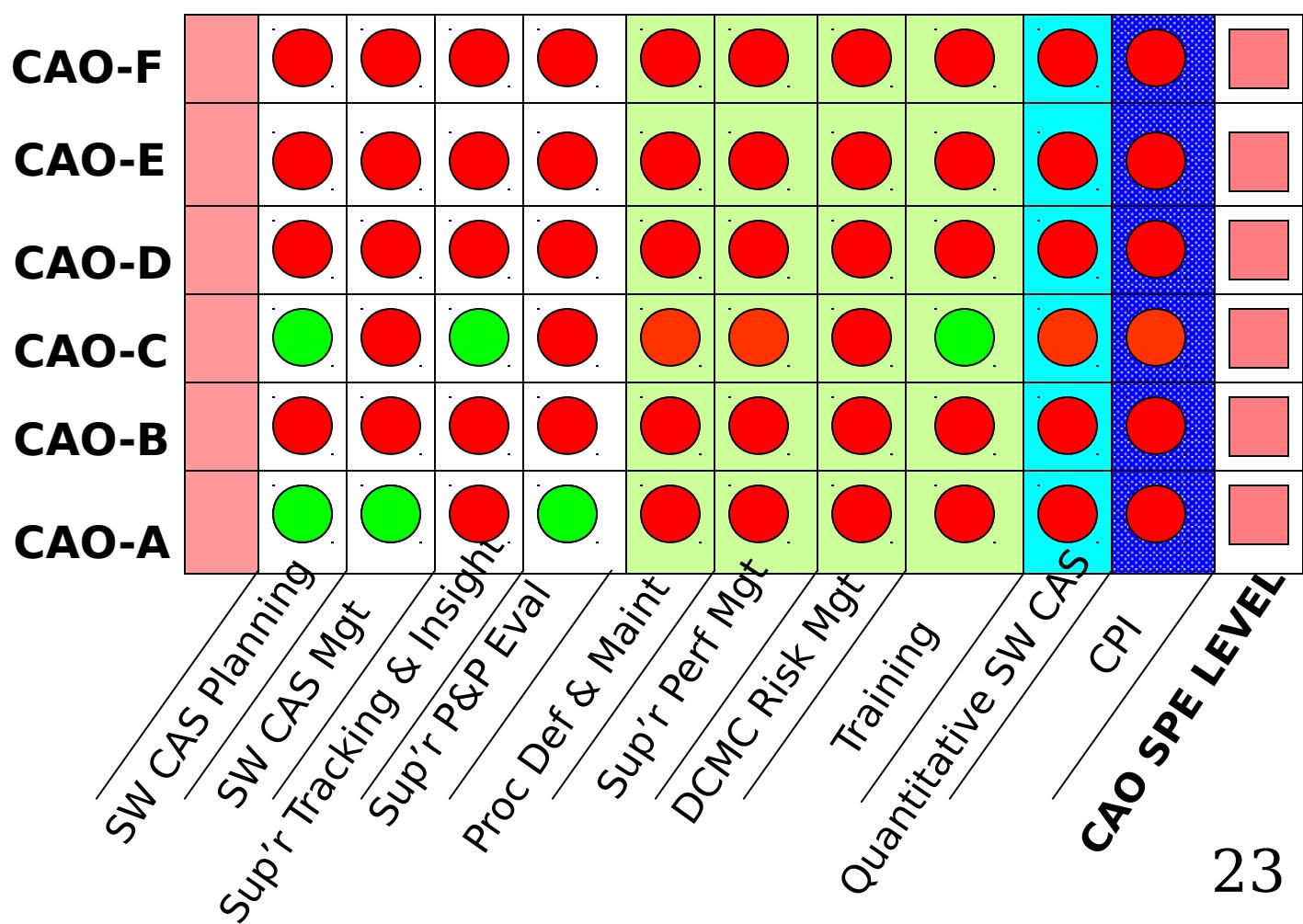


S/W CAS activity performance at CAOs

Pilot Results

Key Process Area (KPA) Satisfaction Profile

| KPA RATING | |
|---------------------|------------------------|
| | = KPA CRITERIA MET |
| | = KPA CRITERIA NOT MET |
| LEVEL RATING | |
| | Performed |
| | Repeatable |
| | Defined |
| | Quantitative |
| | Optimized |





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Model Breakdown

| Repeatable | | Defined | | Quantitative | | Optimized | | |
|-----------------|-------------|-----------------------------|---------------------------------------|----------------------------------|---------------------------------|----------------|----------|-------------------------------|
| SW CAS Planning | SW CAS Mgmt | Supplier Tracking & Insight | Supplier Process & Product Evaluation | Process Definition & Maintenance | Supplier Performance Management | DCMC Risk Mgmt | Training | Continuous Process Improvem't |
| Co 1 | Co 1 | Co1 | Co1 | Co1 | Co 1 | Co 1 | Co1 | Co 1 |
| Co 2 | Co 2 | Co2 | Co2 | Co2 | Ab 1 | Co 2 | Co2 | Co 2 |
| Ab 1 | Ab 1 | Ab 1 | Ab 1 | Co3 | Ab 2 | Ab 1 | Ab 1 | Co 3 |
| Ac 1 | Ab 2 | Ab 2 | Ab 2 | Ab 1 | Ac 1 | Ab 2 | Ab 2 | Ab 1 |
| Ac 2 | Ab 3 | Ab 3 | Ab 3 | Ab 2 | Ac 2 | Ab 3 | Ab 3 | Ab 2 |
| Ac 3 | Ab 4 | Ac 1 | Ac 1 | Ab 3 | Ac 3 | Ac 1 | Ac 1 | Ac 2 |
| Ac 4 | Ac 1 | Ac 2 | Ac 2 | Ab 4 | Ac 4 | Ac 2 | Ac 2 | Ac 2 |
| Ac 5 | Ac 2 | Ac 3 | Ac 3 | Ac 1 | Ac 5 | Ac 3 | Ac 3 | Ac 3 |
| Me 1 | Ac 3 | Ac 4 | Ac 4 | Ac 2 | Ac 6 | Ac 4 | Ac 4 | Ac 4 |
| Ve 1 | Me 1 | 80 | Me 1 | Ac 3 | Me 1 | Ac 5 | Ac 5 | Ac 6 |
| Ve 2 | Ve 1 | Ac 6 | Ve 1 | Ac 4 | Ve 1 | Me 1 | Me 1 | Ac 6 |
| | | Ac 7 | Ve 2 | Ac 5 | Ve 2 | Ve 1 | Ve 1 | Me 1 |
| | | Me 1 | | Ac 6 | | Ve 2 | Ve 2 | Me 2 |
| | | Ve 1 | | Me 1 | | | | Ve 1 |
| | | Ve 2 | | Ve 1 | | | | Ve 2 |
| G1 | G1 | G1 | G1 | G1 | G1 | G1 | G1 | G1 |
| G2 | G2 | G2 | G2 | G2 | G2 | G2 | G2 | G2 |
| | | | | G3 | G3 | G3 | G3 | G3 |
| | | | | | G3 | | | |

Example Profile of DCMC CAO Results per Key Process Areas

Co = Commitment

Ab = Ability

Ac = Activity



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Goal 1: Enhance Program Office visibility

- 1.1: Provide insight concerning contractor processes
- 1.2: ~~Provide insight concerning contractor performance~~
- 1.3: ~~Provide insight concerning contractor evaluations~~

Heads Up

Goal 2

- 2.1
- 2.2
- 2.3

DCMC Software Symposium

Tasking Memo 99-233 (1 Aug 99)



SW Symposium

- Training Conference: 31 Aug - 2 Sep 99
- Agenda:
 - Commander's Perspective: Maj Gen Malishenko
 - DCMC Software CAS Integrated Plan: Ms. Pettibone
 - Customer perspective: Program Offices
 - Training sessions
 - SW Performance Maturity Model
 - Practical Software Measurement
 - Performance measurement
 - Earned Value Measurement
 - CMM Based Insight
 - DCMC Software Professional Estimating and Collection System



Wrapup

Software CAS Mission

- Evaluate for adequacy and perform surveillance of contractor software development processes [FAR* 42.302(a)(41), DoD 5000.2R** (3.3.5.5, 3.3.5.6)]
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*Federal Acquisition Regulation

**Department of Defense Regulation 5000.2R, Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs

Interrelated Functions



Additional Questions/Assistance

**DCMC Software Center (1-888-
616-7598)**

<http://www.dcmc.hq.dla.mil>

DCMC Software Center Mission

- Leverage DCMC resources to support customer requests.
- Train and equip DCMC Software Professionals in “state-of-the-art” software acquisition techniques to provide program offices with visibility into project cost, schedule,

Additional Information:

**April 99 DCMC Special Management
Review**

<http://www.dcmc.hq.dla.mil/bot/mmr/m>

End of Briefing